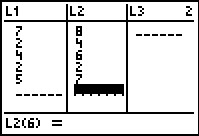
**Scatterplots and Regressions on a TI 83 (family) calculator**

**Data for this example:**

L1: {7,2,4,2,5}  
L2: {8,4,6,2,7}

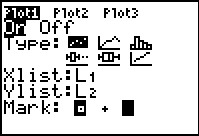


**To input data into the STAT list editor:**

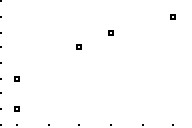
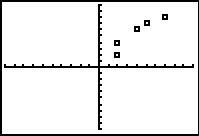
• Enter STAT edit mode by pressing [STAT] [1].  
• Enter the data in the L1 and L2 lists, pressing [ENTER] after each entry.  
• Press [2nd] [MODE] to QUIT and return to the home screen.

**Graph the scatter plot:**

• Press [2nd] [Y=] to access the STAT PLOT editor.  
• Press [ENTER] to edit Plot1.  
• Press [ENTER] to turn ON Plot1.  
• Scroll down and highlight the scatter plot graph type (first option in the first row). Press [ENTER] to select the scatter plot graph type.  
• Scroll down and make sure Xlist: is set to L1 and Ylist: is set to L2. To input L1, press [2nd] [1]. To input L2, press [2nd] [2].



• Press [GRAPH] to display the scatter plot. To get a better view of the graph, press [ZOOM] [9] to perform a ZoomStat.



**Regression**

|  |  |
| --- | --- |
| First enter the data set into the data editor (see data set entry). Note which column of data in the data editor is for the input (independent) variable and which are for the output (dependent) variable. For illustration, we assume that the input data are in list (column) L1 and the output data are in list L2. After data entry, plot (see scatter plot) the data to get a good feel for the regression problem at hand. The displayed example shows the growth of yeast; hence, for our example we conduct a logistic regression. | http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/reg1.gif |

|  |  |
| --- | --- |
| Press http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/Sta.gifto access the statistics menu. Press the right arrow on the thumb pad to highlight the CALC menu. The TI-83 can perform a regression to find the equation of best fit for nine different types of equations: cubic, exponential, linear, logarithmic, power, quadratic, quartic, sinusoidal and logistic. We emphasize that only the user can determine the type of function to use. | http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/reg2.gif |

For our illustration, we find the logistic equation of best fit. Highlight **B:Logistic** and then press http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/Ent.gif. You are then sent to the home screen with Logistic followed by a blinking cursor.

|  |  |
| --- | --- |
| http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/reg3.gif | http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/reg4.gif |

The logistic information screen is then displayed (see below, left screen). After the regression function is determined, we plot the data with the graph of the regression equation. To view the plot, press http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/Zoo.gifto access the zoom menu, then select **9:ZoomStat**. If desired, press http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/Win.gifand adjust the window, then press http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/Gra.gif.

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| http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/reg5.gif | http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/2nd.gifL1 (located above the 1 key), http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/2nd.gifL2 (located above the 2 key), http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/Vars.gif thumb pad right arrow to highlight Y-VARS http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/1.gif(to select **1:Function**) http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/1.gif(to select **1:Y1**) http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/Ent.gif |

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| --- | --- |
| http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/reg6.gif | http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/reg7.gif |

If the plot shows the graph of an unwanted function, go to the equation editor (**Y=**) and deselect it by placing the cursor over the highlighted = for that function, then press http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/Ent.gif. Press the thumb pad down arrow and notice that the = is no longer highlighted. Press http://www.prenhall.com/divisions/esm/app/calc_v2/calculator/medialib/Technology/Documents/TI-83/Images/TI-Gifs/Gra.gifto view the new graph.

**Note** All regressions on the TI-83 are done in the same manner as the example given above. The only difference from one problem to another is the data set used and the equation selected for the regression.

**Scatterplots on the TI-89**

The TI-89 can take data points and make a scatterplot. You can then use a *regression* , which will provide you with a function that matches your data.

Begin at the HOME screen. To begin entering your data, hit the APPS button. Press 6 to enter the *Data/Matrix Editor*. Press 3 to create a New set of data. Scroll down to the Variable box and enter the name of your project. Press enter.

A blank data screen appears, resembling a table. The *c1* field is your independent variable (x value), and the *c2* field is the dependent variable (y value). Enter your data in the table.

After you’re done entering your data, we need to *define the plot*. Hit F2, and then make sure *Plot 1* is highlighted and hit F1. The plot definition window appears. Scroll down to *x* and enter in c1. Type in c2 for y. Hit Enter, and the Plot 1 that was highlighted before should now show a scatterplot icon and labeled *x:c1 y:c2.* Hit enter to return to the data editor.

Defining the plot allows the scatterplot to be graphed. However, we also want a function that corresponds to the data. Look at the shape of your function!

What kind of function does your graph appear to be?

To find an equation for your data, hit F5 to get the Calculate window. For *Calculation Type*, hit the  button and choose a type of *Reg* where you choose your graph type*.* You may choose a linear function with LinReg, an Exponential function with ExpReg, a Quadratic function with QuadReg, a Power function with PowerReg, a natural log function with LnReg, a Cubic function with CubicReg, Quartic function with QuarticReg, and finally a Sine function with SinReg. Like before, enter in *c1* for x and *c2* for y. In the *Store RegEQ* box, hit the  button and choose y1(x). This will put the equation into the Y= screen for you. Hit Enter. It will display the equation of the function that matches your data.

Now, let’s make sure that the scatterplot and function were put into the Y= window. Hit Diamond-F1 to enter the Y= window. There should be entries for both Plot 1 and y1. Hit F2 and scroll down to *9: ZoomData* to zoom into your data. Hit enter, and the TI-89 will display the scatterplot, and then graph the function. The line that appears (the function) should closely match the scatterplot. Look to see if you get a correlation coefficient r . If you do, you can find out how well the model fits the data. The better the model fits the data, the closer r is to |1|. If r is positive, the variables have a positive correlation. If r is negative, the variables have a negative correlation.

If you need to access your data again, go to APPS, Data/Matrix Editor, and Open.

You are to make a regression for each set of data:

1. (***Physics) Newton’s Law of Cooling:*** *Zach* takes out a pizza from a 375 degree oven and places it on the counter to cool in a room that is 68 degrees. The pizza loses 50 degrees of heat in the first 2 minutes. The following chart describes the temperature of the pizza over time (beginning when the pizza is removed from the oven).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Minutes | 0 | 2 | 4 | 7 | 10 |
| Temp of pizza (degrees) |  |  | 244 | 188 | 151 |

C:\Documents and Settings\t_berres\Local Settings\Temporary Internet Files\Content.IE5\WYYKDKWB\MC900333068[1].wmf a. Fill in the two missing blanks of the chart.

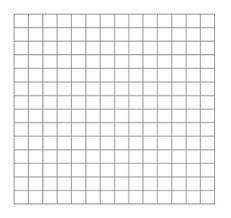
b. Create a scatterplot and regression using your calculator. Sketch the scatterplot to the left and annotate what kind of regression this will be from the “Calc” menu.

c. Describe what is happening in the graph. Use to model to find (algebraically) how long before the pizza is ready to eat (about 200 degrees)?

d. Does the pizza cool indefinitely? What is the coolest that you think the pizza could get?

2. ***(Calculus) Candy making****:* Suppose you had a factory that made Hershey Kiss *type* candies. You want to know the volume of each candy for business purposes. Use regression capabilities from data in your table to get a function that models your data fairly well.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x |  |  |  |  |  |  |  |  |  |
| radius |  |  |  |  |  |  |  |  |  |



a. Set up the integral that gives the volume of your shape.

b. Use integration capabilities of a calculator to find the volume of your shape.

Hint: copy and paste your regression equation from the y= screen to the home screen